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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/707,037	11/17/2003	Erica Murray	81044190/FMC1629PUS	1036
28395 7590 09/10/2007 BROOKS KUSHMAN P.C./FGTL 1000 TOWN CENTER 22ND FLOOR SOUTHFIELD, MI 48075-1238			EXAMINER ECHELMeyer, ALIX ELIZABETH	
			ART UNIT 1745	PAPER NUMBER
			MAIL DATE 09/10/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.		Applicant(s)	
	10/707,037		MURRAY ET AL.	
	Examiner		Art Unit	
	Alix Elizabeth Echelmeyer		1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 May 2007.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5,7,9-16,18-26,28,30-32 and 34 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5,7,9-16,18-26,28,30-32 and 34 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

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DETAILED ACTION

Response to Amendment

1. This Office Action is in response the amendment filed May 15, 2007. Claims 1, 7, 9, 12, 14, 20-22, 28, 30, 32 and 34 have been amended. Claims 5, 8, 17, 27, 29, 33 and 35-43 have been cancelled. Claims 1-5, 7, 9-16, 18-26, 28, 30-32 and 34 are pending and are rejected for the reasons given below.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 15 and 16 recite the limitation "molecular oxygen" in the first mixture.

There is insufficient antecedent basis for this limitation in the claim, since claim 14, from which the claims depend, does not recite molecular oxygen.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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5. Claims 1-5, 7, 9-16, 18-26, 28, 30-32 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kearl (US 6,677,070) in view of Anzai et al. (US 2003/0060364).

Kearl teaches a solid oxide fuel cell that operates at a temperature from 400-800°C (column 8 lines 53-58). The solid oxide fuel cell operates on hydrogen as fuel, as is well known in the art and disclosed (column 4 lines 65-67).

Regarding claims 10, 11, 21, 31 and 32, Kearl teaches the anode layer 18, comprises a material selected from the group consisting of nickel (Ni), Ni-yttria stabilized zirconia cermet (Ni-YSZ cermet), copper doped ceria, gadolinium doped ceria, strontium doped ceria, yttria doped ceria, Cu-YSZ cermet, Co-stabilized zirconia cermet, Ru-stabilized zirconia cermet, LSGM+nickel oxide, and mixtures thereof (column 6 lines 1-7).

Kearl discloses reforming a fuel mixture to produce hydrogen for use in the fuel cell (column 4 lines 65-66), but fail to teach the use of the specific mixtures of the instant claims.

Anzai et al. teach reformation of fuel gas to produce hydrogen for use in fuel cells. In the method of Anzai et al., hydrocarbons and/or oxygen-containing hydrocarbons are converted to a reformed gas, which is composed principally of hydrogen by an autothermal reforming reaction using such a catalyst ([0002]).

As for claims 2, 14, 22 and 23 Anzai et al. disclose that the feedstock for producing a reformed gas is composed principally of hydrogen may be hydrocarbons and mixture thereof; *specific examples include dimethyl ether* ([0053]). In the process,

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the feed stock hydrocarbons are converted to a reformed gas composed principally of hydrogen in the presence of the catalyst by an autothermal reforming reaction.

Regarding claims 3, 26 and 34, since the reactants of Anzai et al. and those of the instant specification are the same, the products would inherently be the same.

With regard to claims 4, 5, 15, 16, 24 and 25, Anzai et al. disclose the oxygen to be introduced together with the feedstock is introduced in the reformer in such an amount that the O₂/carbon ratio is 0.1 to 0.5 and preferably 0.2 to 0.4 ([0052]), as defined in applicants' claim 4 and 5.

As for claims 7, 9, 18-20, 28 and 30, Anzai et al. also teach that the reaction temperature is generally 200 to 800°C and preferably 300 to 600°C ([0049]). In this case, 600°C is interpreted to be "about 550°C", as required in claim 12. Additionally, Applicant is directed to the instant specification, wherein it is disclosed that enhancements are observed at 550°C and 600°C ([0035] of instant specification, Electronic Version, 11/17/2003).

Regarding claims 12, Anzai et al. disclose reforming wherein the oxygen to carbon molar ration is 0.33 and the reaction temperature is 600°C ([0121]).

Anzai et al. further teach that their reforming reaction suppresses the precipitation of carbon at a low steam/carbon ration ([0008]).

It would be advantageous to use the reforming reaction of Anzai et al. with the fuel cell of Kearn because the reaction produces hydrogen, which is well known to be

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fuel for fuel cells, it prevents the need to transport pure hydrogen as gas to the fuel cell, and it suppresses the precipitation of carbon at a low steam/carbon ration.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to use the reforming reaction of Anzai et al. with the fuel cell of Kearn because the reaction produces hydrogen, which is well known to be fuel for fuel cells, it prevents the need to transport pure hydrogen as gas to the fuel cell, and it suppresses the precipitation of carbon at a low steam/carbon ration.

Response to Arguments

6. Applicant's arguments, see Remarks, filed May 15, 2007, with respect to the rejection of Grieve in view of Anzai et al. (see p. 9 of Remarks) have been fully considered and are persuasive. The rejection has been withdrawn. However, upon further consideration, a new ground of rejection is made (see above).

7. Although a new rejection has been made, some of the arguments will be addressed, specifically:

- On page 8, Applicants argue that the system of Grieve operates at a higher temperature than the desired reformation temperature. This is moot, since the rejection over Grieve has been withdrawn.
- On page 8, Applicants argue that the Anzai et al. reference does not teach the use of the reformer with solid oxide fuel cells. While this is true, it is

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entirely within the ordinary skill of the art to use with a solid oxide fuel cell a reformer that is disclosed for use with fuel cells in general.

- On pages 8-9, Applicants argue that Kearn does not teach the operation of the fuel cell with a $\text{CH}_3\text{-O-R}$ and oxygen mixture. This is true, but Kearn teaches the use of a fuel mixture reformed to produce hydrogen.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alix Elizabeth Echelmeyer whose telephone number is 571-272-1101. The examiner can normally be reached on Mon-Fri 7-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Susy N. Tsang-Foster can be reached on 571-272-1293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Alix Elizabeth Echelmeyer
Examiner
Art Unit 1745

aee


SUSYTSANG-FOSTER
PRIMARY EXAMINER